Tendon Engineering for Comprehensive Advanced Rehabilitation and Enhancement Innovation for Tendon Repair

The project

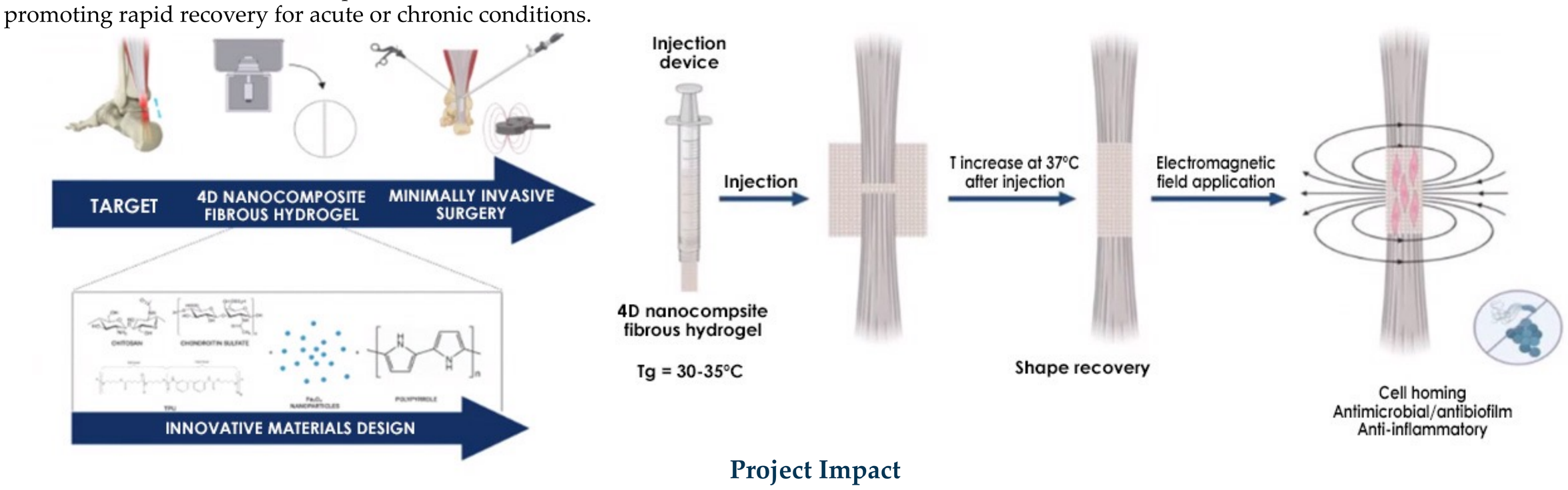
Every year, around 33 million musculoskeletal injuries are reported, of which approximately 50% involve tendon and ligament injuries. Due to the diverse aetiology of these injuries, there is no universal ('one-fits-all') solution. Tendon disorders are significantly debilitating, associated with severe pain, motor impairment, and loss of self-sufficiency.

Ten4Care represents a crucial opportunity for the European Materials and Medical Technology (MedTech) industries to address this challenge. We seek to address the health complexities associated with these disorders, promoting rapid recovery for acute or chronic conditions.

Aim

The main aim of the **Ten4Care** project is to develop innovative, minimally invasive, and personalised treatment solutions for tendon injuries using advanced shape-memory biomaterials and 4D hydrogels.

These novel biomaterials, designed to respond to external stimuli and loaded with an anti-inflammatory drug, will be doped with magnetic nanoparticles to significantly aid tendon repair, reduce recurrence rates, and promote tissue regeneration while minimising complications associated with current surgical approaches.



Project Impact

Social

Address the health complexities associated with tendon and ligament disorders, promoting rapid recovery for acute or chronic conditions.

Technological & Industrial

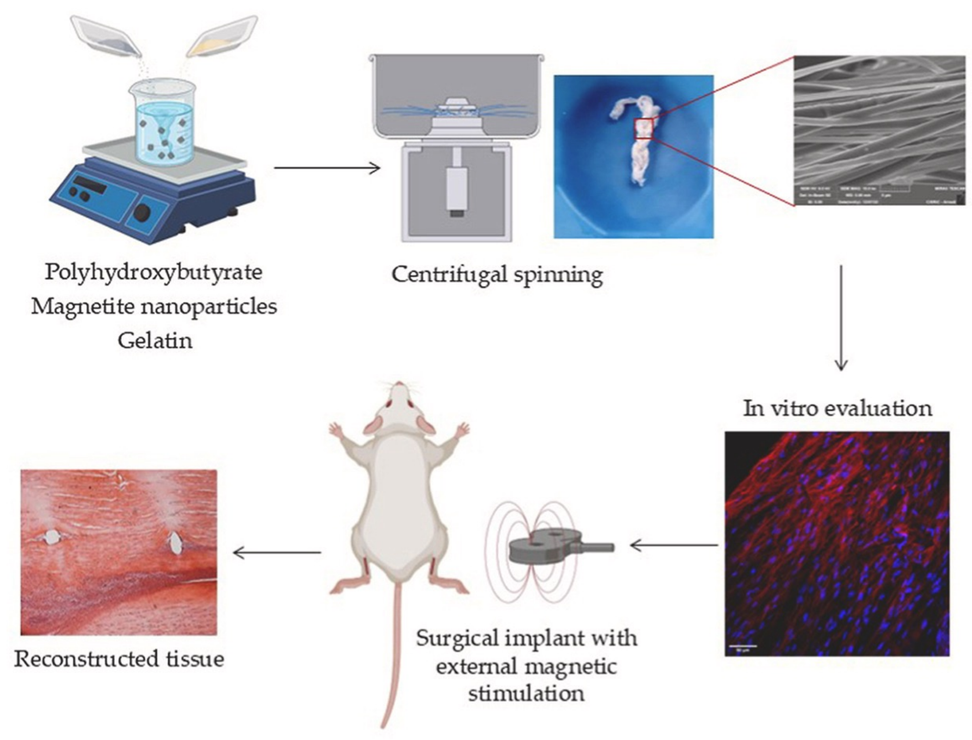
Boos the EU's industrial leadership in advanced materials and sustainable manufacturing technologies.

Environmental & Regulatory

Ensure safe, sustainable and easily transferable results to the clinical market.

Magnetic Scaffolds for the Mechanotransduction Stimulation in Tendon Tissue Regeneration

E. Bianchi et al., 2025. *Materials Today Bio*

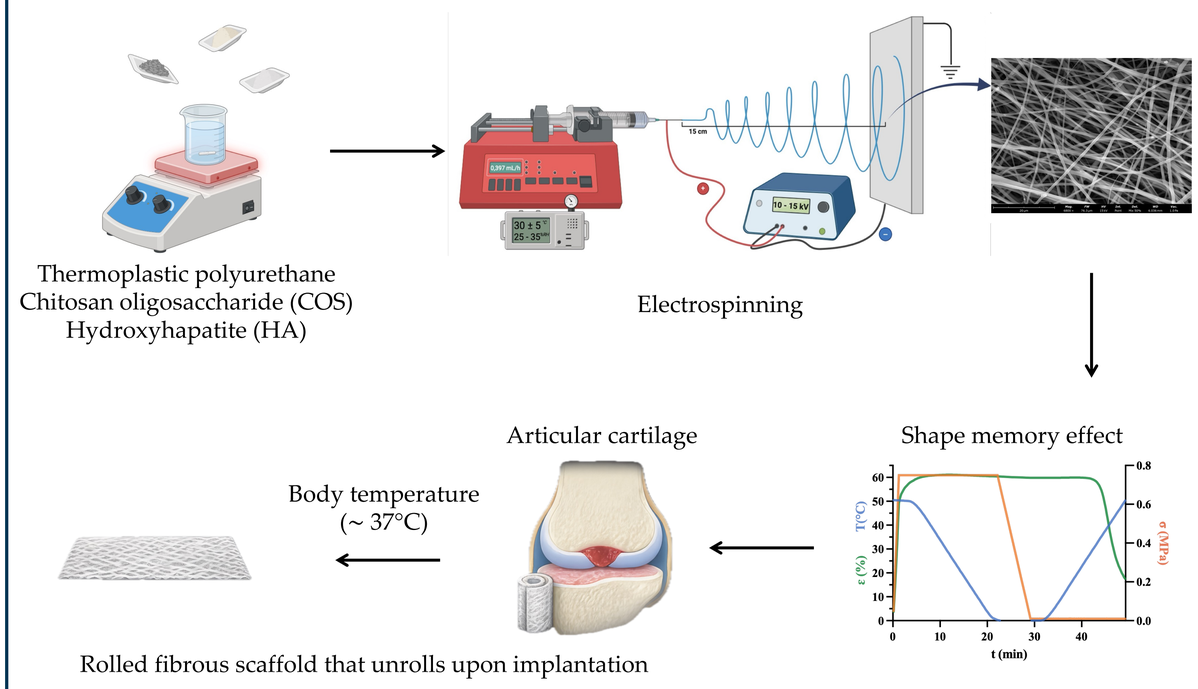


Highlights

- Fibrous scaffolds enriched with magnetite possessed a superparamagnetic behavior.
- Scaffolds showed a tendon-like morphology, supporting the host tissue regeneration.
- Scaffolds magnetically stimulated promoted cell alignment and proliferation *in vitro*.
- Scaffolds magnetically stimulated *in vivo* led to lesion complete healing after 1 week.

Smart Composite Thermo-Responsive Scaffolds for Cartilage Repair

E. Maffioli et al.



Highlights

- Fibrous scaffolds enriched with HA and tailored with COS possessed shape memory properties (shape fixity ratio of 98% and shape recovery ratio of 70%).
- The final scaffold showed load-bearing properties suitable for articular cartilage.
- *In vitro* degradation and cell viability assays are ongoing to assess the stability and biocompatibility of the systems. The cartilage regeneration potential will be evaluated.

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